MULTIMEDIA UNIVERSITY

STUDENT ID NO

MULTIMEDIA UNIVERSITY

FINAL EXAMINATION

TRIMESTER 2, 2018/2019

PEM0016 – ALGEBRA

(Foundation in Engineering)

8 MARCH 2019
3.00 p.m. – 5.00 p.m.
(2 Hours)

INSTRUCTIONS TO STUDENT

1. This question paper consists of **THREE (3) pages** including cover page with **FOUR (4) questions** only.
2. Attempt **ALL** questions. All questions carry equal marks and the distribution of the marks for each question is given.
3. Please write all your answers in the Answer Booklet provided. All necessary working **MUST** be shown.
4. Only **non-programmable** calculator is allowed.

QUESTION 1 [25 marks]

(a) Use completing square technique to solve the equation below. Leave your answer in exact value.

$$\frac{11(x-3)}{x-2}+\frac{6}{x}=\frac{-6}{x(x-2)}$$ (6 marks)

(b) If $t=\frac{x+2}{x-2}$ and $t^2-3t=28$, find all possible values of x. (5 marks)

(c) Solve the inequality below. Express your answer using interval notation.

$$\left|\frac{4x+3}{3}-\frac{7}{2}\right|<2$$ (4 marks)

(d) Solve the inequality: $\frac{x^3-16x}{x^3-x^2}>0$. (10 marks)

QUESTION 2 [25 marks]

(a) For the below functions,

$$f(x)=\frac{x}{x+4} \qquad g(x)=\sqrt{x^2-10}$$

do the following:

(i) Find the domain for both functions, D_f and D_g. (4 marks)

(ii) Calculate $(g.f)(4)$ and $(f\circ g)(4)$. (4 marks)

(iii) Determine $(f(x))^{-1}$ and $g^{-1}(x)$. (4 marks)

(iv) Determine whether the functions are even, odd or neither. (4 marks)

(b) On the same graph, draw the following functions and plot the three significant points for each function:

$$y=\frac{1}{2}10^x \qquad y=\log(2x)$$ (9 marks)

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QUESTION 3

(a) Find the horizontal/oblique asymptote of the following graphs:

(i) $y(x)=\dfrac{4x^2+x-4}{x^2+2}$ (3 marks)

(ii) $y(x)=\dfrac{x^4+2x}{x^3+3}$ (3 marks)

(b) For polynomial $f(x)=x^2(x^2-4)$, do the following:

(i) Find the $x-$ and $y-$intercepts of the graph of the function. (5 marks)

(ii) Find the intervals on which the graph of the function is above and below the $x-$axis. (2 marks)

(iii) Graph the function. Include the turning points which occur at $x=-1.414$ and $x=1.414$. (4 marks)

(c) Compute the partial fraction decomposition for:

$$y=\frac{4x+3}{x^2-9}$$ (4 marks)

(d) Use Binomial Expansion to find the coefficient of x^9 in the expansion of:

$$(2x-3)^{10}$$ (4 marks)

QUESTION 4

(a) Solve the following matrix equation:

$$\begin{bmatrix}-1 & -3\\ 1 & 6\end{bmatrix}\begin{bmatrix}x\\ 2\end{bmatrix}-\begin{bmatrix}10y\\ 4y\end{bmatrix}=\begin{bmatrix}6\\ 3\end{bmatrix}$$ (5 marks)

(b) Solve the following equations by using Cramer's Rule:

$$\begin{aligned}-x+3y-7z&=13\\ x+y+z&=2\\ x+2y+3z&=5\end{aligned}$$ (12 marks)

(c) Solve the following equations by using Inverse Matrix Method:

$$\begin{bmatrix}1 & -3\\ 5 & 1\end{bmatrix}\begin{bmatrix}x\\ y\end{bmatrix}=\begin{bmatrix}2\\ 4\end{bmatrix}$$ (8 marks)

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